Poisson Image Editing

Priyatham

Roshan

Saicharan

Poisson Equation

- Poisson equation natural in many CV applications
- Psychology: Human eyes perceive strongly only the second order changes in intensity
- Useful in image editing

The Idea: Guided Interpolation

- Let S(x,y) be the domain of the image, Ω be a subset of the domain on which we want to edit the image.
- There is a known image f* on S/Ω. We need to find the image f on Ω such that f resembles some known g.

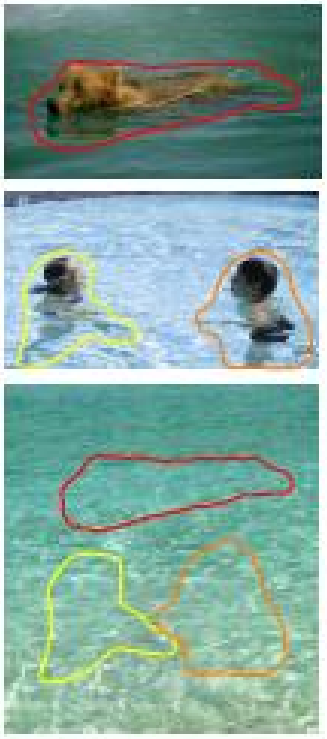
The Idea: Guided Interpolation

- Let **v** = grad(g)
- $$\min_f \iint_\Omega |\nabla f - \mathbf{v}|^2 \text{ with } f|_{\partial\Omega} = f^*|_{\partial\Omega},$$
- which is equivalent to:

$$\Delta f = \text{div}\mathbf{v} \text{ over } \Omega, \text{ with } f|_{\partial\Omega} = f^*|_{\partial\Omega},$$

Seamless Cloning

- This method can be used to seamless merge one image into another at a specific region.



sources/destinations

cloning

seamless cloning

Other applications

- Different choices of **v**(guidance field), gives different image editing applications.
- **v**=grad(g) results in seamless cloning
- Seamless cloning washes out texture details of source image. This is undesirable sometimes

Towards Mixed Cloning

- Source Image: Cloning

Seamless (Note the texture)

Mixed Cloning

- **v** = max(grad(g), grad(f*))

Texture Flattening

- **v(x,y)** = grad(g) if there is an edge at x,y
- **v(x,y)** = 0 otherwise

Conclusion

- There are many other applications that can be derived from this general tool of Poisson Image Editing.
- Local illumination changes to suppress specular reflections, underexposure etc
- Local Colour changes
- Seamless Tiling